POLI 204C: Introduction to Game Theory
Spring 2017

Instructor: David Wiens
Office: SSB 387
Office hours: W 14:00-17:00
Email: dwiens@ucsd.edu
Web: www.dwiens.com
(password for Google Classroom: hx0uwt)

Course Description

This course is a rigorous introduction to the basic concepts and logic of noncooperative game theory. We will focus on modeling issues and solution concepts. Some familiarity with first-order logic and basic set theory will be essential. The course requirements will not assume mathematical proficiency beyond basic algebra (and maybe some differential calculus).

Course Texts

Lectures will mostly draw on the following texts. The first and third are available from the UCSD bookstore; chs. 1–5 of the second are available on the Google Classroom page. (The third provides crucial background for the course. You should get a copy.)

1. Tadelis, *Game Theory* (Princeton UP, 2013)
2. Watson, *Strategy* (Norton, 3rd ed. 2013)
3. Velleman, *How To Prove It* (Cambridge UP, 2006)

Whether you grasp the salient intuitions behind a concept often depends on how the concept is presented to you. So it is worth checking out other texts for the sake of comparison. Here are some helpful ones.

1. Fudenberg and Tirole, *Game Theory* (MIT Press, 1991)
2. Gibbons, *Game Theory for Applied Economists* (Princeton UP, 1992)
3. Gintis, *Game Theory Evolving* (Princeton UP, 2nd ed. 2009)
4. McCarty and Meirowitz, *Political Game Theory* (Cambridge UP, 2007)
5. Rasmusen, *Games and Information* (Blackwell, 4th ed. 2007)
6. Williams, *Introduction to Game Theory: A Behavioral Approach* (Oxford UP, 2013)

Class Policies

1. Electronic devices (laptops, tablets) are prohibited, unless you secure an exemption from me. Any cell phone that is pulled out during class must be placed face-down on the desk for the remainder of class (excepting emergencies, of course).

2. All problem sets must be typeset — preferably LaTeX, Word accepted — and a hardcopy submitted at the agreed upon time. (I've linked to a comprehensive guide to LaTeX symbols on the course materials page.) Handwritten problems sets will be returned ungraded.

3. Late submissions (problem sets or exams) will not be accepted once the solutions have been posted online, unless you have confirmed with me, in advance, arrangements to the contrary. Information about the times at which I will post solutions is below.

4. Group work. Collaboration on take home exams is strictly prohibited. You are, however, encouraged to work together when solving problem sets (sorting out solution strategies, doing scratch work, etc.). However, you are prohibited from submitting jointly written answers — *all submissions must be independently written*. In addition, the first paragraph of each problem set submission must (a) enumerate the other students with whom you worked on the solutions, and (b) give a rough indication of the group members' relative contribution to the solutions. Please note carefully: it is in your interest that you not rely too heavily on others; make sure you have a firm grasp of the logic of the answers. The problem sets are meant to be training exercises for the exams; you will do well on the exams *if and only if you understand the logic of the problem set solutions*.

5. Academic misconduct (e.g., see last item) will be vigorously prosecuted. The academic sanction is an automatic F for the course. The administrative sanction (e.g., suspension, termination) will be determined by the UCSD Academic Integrity Office upon their review of the incident.

Assessment

Do not allocate your effort to maximize your grade; allocate your effort to maximize your understanding.

Overview. There will be five problem sets and three take home exams. For the purposes of calculating your final grade, these will be weighted as follows:

Weight	Assignment
25%	Problem sets (aggregate score)
25%	Exam 1 (end of week 4, date and time TBD)
25%	Exam 2 (end of week 7, date and time TBD)
25%	Exam 3 (end of quarter, date and time TBD)

Problem sets. There will be five problem sets. These are meant to be reasonably low-stakes "training exercises" to prepare you for the exams. Problem sets are optional in the sense that there's a relatively low overall cost for declining to submit solutions for a problem set. That said, you'd be wise not to skip these.

Solutions must be submitted in hard copy and will be accepted anytime prior to the solutions being posted online. I will post solutions as follows:

- Problem set 1: Friday 14 April at 15:00
- Problem set 2: Friday 28 April at 15:00
- Problem set 3: Friday 12 May at 15:00
- Problem set 4: Friday 26 May at 15:00
- Problem set 5: Friday 8 June at 15:00

Problem sets will be graded on a ✓/✗ basis. The minimum standards for a ✓ are as follows.

- *Conscientious effort.* You must demonstrate a reasonably serious effort to provide your own answers to each problem. Simply copying answers from other sources (e.g., the textbook, past solution keys, etc.) does not qualify.
- *Minimal competence.* Your answers must demonstrate a satisfactory grasp of key concepts and follow problem-solving strategies that could be reasonably expected to get you to a solution (e.g., the kinds of strategies that can be found in standard textbooks or in lectures).

Aggregate scores for problem sets will be calculated according to the table. For every problem set for which you decline to submit solutions, your aggregate score will drop by a one-third step. E.g., if you have 3 ✓, 1 ✗, and 1 non-submission, your aggregate score will fall to B; if you have 3 ✓ and 2 non-submissions results in a B−.

# of ✓	Letter
5	A
4	A−
3	B+
2	B
1	B−
0	C+

A note about how to write up solutions. *Use prose to make your reasoning transparent to the reader.* For example, suppose you are asked to prove a theorem like the following one. (Incidentally, by now you should be familiar enough with the material in Velleman to follow this proof. If you can't follow, you have some work to do.)

Theorem. *If $A \subseteq B$ and $A \subseteq C$, then $A \subseteq B \cap C$.*

Write your proof like this:

Proof. Let x be arbitrary and assume $x \in A$. By definition of $\subseteq$, our hypotheses are $\forall x(x \in A \to x \in B)$ and $\forall x(x \in A \to x \in C)$. So, by universal instantiation, we can conclude that $x \in B$ and $x \in C$. Since x is arbitrary, we can use universal generalization and $\wedge$-introduction to conclude that $\forall x[x \in A \to (x \in B \wedge x \in C)]$. Thus, by the definitions of $\subseteq$ and $\cap$, we conclude that $A \subseteq B \cap C$. □

Do not write your proof like this:

Proof. x arbitrary and $x \in A$.
$\Rightarrow \forall x(x \in A \to x \in B)$ and $\forall x(x \in A \to x \in C)$
$\Rightarrow x \in B$ and $x \in C$
$\Rightarrow \forall x[x \in A \to (x \in B \wedge x \in C)]$
$\therefore A \subseteq B \cap C$. □

Exams. There will be three take home exams. These are not to be done in collaboration with others. You will be permitted to use your notes and the textbook. The exam questions will be posted online at a mutually agreed upon time (to be determined during the first week of class). Solutions will be submitted electronically through Google Classroom. You will have five hours to complete the exam from the time it is posted, at which point I will post the solutions. No exams will be accepted once the solutions are posted online.

Fair warning: the level of difficulty for the exams will be set so that it is unlikely that anyone will finish in the allotted time. But don't worry — do your best and I'll curve the grades for each exam.

Calculating your overall grade. Your final letter grade will be the weighted grade point average for the problem sets and exams in accordance with the weights in the table above. (Information about grade points can be found at `http://blink.ucsd.edu/instructors/academic-info/grades/system.html`.)

Provisional Schedule

Subject to revision.

Week 1	Why models? (Readings on Google Classroom)
Weeks 1/2	(Expected) Utility theory (Tadelis, part 1)
	Problem set 1
Weeks 2/3	Model basics (Tadelis, chs. 3, 6 & 7; Watson, chs. 1–5)
	— *Games with complete information* —
Weeks 3/4	Static (Tadelis, chs. 4–6; see also: Watson, chs. 6–11)
	>Dominance, Nash equilibrium
	Problem set 2
Weeks 5/6	Dynamic (Tadelis, chs. 8–11; see also: Watson, chs. 14–15)
	>Subgame perfect equilibrium, repeated games
	Problem set 3
	— *Games with incomplete information* —
Weeks 7/8	Static (Tadelis, ch. 12)
	>Bayesian Nash equilibrium
	Problem set 4
Weeks 9/10	Dynamic (Tadelis, chs. 15–17; see also: Gibbons, ch. 4)
	>Perfect Bayesian equilibrium, sequential equilibrium
	Problem set 5

First exam will cover material up to the end of week 4
Second exam will cover material from week 3 through week 7
Third exam will cover material from week 7 through week 10